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⑭考案の名称 枚葉輪転印刷機における刷胴部の紙あばれ防止装置

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⑤実用新案登録請求の範囲

胴の周面に近接し胴軸方向に平行して回動自在に軸架されたブラシ軸と、このブラシ軸に固定された毛先を胴周面上の搬送経路に接続させて胴軸方向に配設されたブラシと、前記ブラシ軸の軸端部に設定された連結部にころが転着されたカムレバーと、前記ころを接離させる大径部と小径部とからなるカム面を有し前記胴の軸端部に固定されたブラシ着脱用カムと、前記ころをカム面に圧接させる方向の付勢力を前記カムレバーに付与する付勢手段とを設けたことを特徴とする枚葉輪転印刷機における刷胴部の紙あばれ防止装置。

考案の詳細な説明

本考案は枚葉輪転印刷機において印刷を爪で咥えられた紙の前尻部非印刷部があばれるのを防止する装置に関するものである。

枚葉輪転印刷機にはオフセット印刷機、凹版印刷機、ドライオフセット凹版印刷機、検査印刷機など多くの機能があるが、これらはいずれも印刷胴胴とインキ装置とを有する印刷装置と、その前後の給紙装置および排紙装置とを備えており、検査印刷機には、この他に検査胴と検査装置とを備えた検査装置が設けられている。そして、給紙装置によって一枚ずつ送り出された紙は、印刷胴や検査胴および搬送チェーンの爪と爪との間で紙前部を咥え替えられながら搬送される。

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ところがこのような枚葉輪転印刷機においては、咥え替え後に胴周へ巻き付けられる紙の挙動について問題があった。すなわち、第1図はオフセット印刷機を例にとって示す従来図であって、胴後部のスイング装置や渡し胴などの上から圧胴1の爪2に咥え替えられた紙3は、矢印方向に回転する圧胴1とゴム胴4との間を通過して圧胴1の周面に巻き付けられ、紙3のゴム胴4側表面には、ゴム胴4上の画像が転写されて印刷が施される。ところが、図に示すように爪2による紙3の咥え始が両胴1，4の接点を過ぎた状態では、紙3の後半部が何物にも保持されていないために、印刷のための両胴1，4間の印圧が紙3に加えられながら両胴1，4が高速回転すると、紙3は両胴1，4によって紙尻方向へしごかれるとともに、遠心力で振り回されて浮き上り、周囲から30～50mmのところをばたつきながら通過する。したがって紙3の一部がゴム胴4の周面に接触し、紙3にインキが付着して汚れたり、画像の一部が転写されたりする。これがゴム胴4の周面に紙3がぴったり密着した状態での付着であれば問題ないが、図のようにばたついた状態で付着すると、この付着したインキによる紙汚れとこのあと正規に転写される紙汚れとがわずかにずれて2重に印刷されてしまう。以上は印刷胴の場合であるが、検査胴の場合には、胴周面に巻き付けられた紙を検査

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機械で検査することになるので、この紙が第１図に示すようにばたつくと、検査精度が著しく低下し、誤動作の原因となることが多い。

このように各種の弊害が発生するので、従来、両側の紙排出手前にブラシを設け、これをばたつこうとする紙に接触させて押えるようにすることが提案されたが、第１図で明らかなように、爪２の爪先部が紙面よりも高いので、ブラシが爪２で周期的に弾かれることになり、ブラシの耐久性が合わせて低く抑えず交換を要するという不具合があった。

本考案は以上のような点に鑑みなされたもので、印刷後の搬送紙面に毛先を接触させて紙軸方向に延びるブラシを回動自在なブラシ軸に支持させるとともに、このブラシ軸に固定したカムレバー基端部のころを駆動上のカムのカム面にばね部材で圧接させ、軸の回転にしたがってブラシを紙面に接触させるように揺動することにより、必要時のみブラシを紙面に接触させて紙あばれを防止するとともに、不必要時にはブラシを紙面から離間させて爪などの当接によるブラシの摩耗防止を計った枚葉輪転印刷機における胴周部の紙あばれ防止装置を提供するものである。以下、本考案の実施例を図面に基いて詳細に説明する。

本実施例は本考案を検査輪転印刷機に実施した例を示し、第２図はこれを実施した印刷機の概要側面図、第３図は紙あばれ防止装置の展開側面図、第４図は第３図のAA断面図、第５図は第３図の正面断面図、第６図は第３図のC視拡大正面図である。図において、検査輪転印刷機１１は、給紙装置１２と、検査装置１３と、印刷装置１４および排紙装置１５を備えており、給紙装置１２には、前工程で紙面が印刷された新聞等の紙１６を積載してその減量により自動的に上昇する紙積台１７が設けられている。また、検査装置１３の上部には給紙装置１２によって紙板１６上へ１枚ずつ送り出された紙１６を捕えて搬送するスイング１９が配設されており、その下方には一対の検査胴２０，２１が、互に周面を対接させて回転自在に軸架されている。これらの検査胴２０，２１の外周切欠面内には、カム機構で揺動する複数個の爪が軸方向に並列して設けられており、スイング１９の揺動によって搬送された紙１６を捕え替えたのち、第１図の矢印方向への回転により紙１６を胴２０，２１の周面へ巻き付けながら搬送するように軸架されている。また、各検査胴２０，２１の周面近傍には、搬送される紙１６の表裏両面の絵柄を検査し不正紙を検出して信号を発する検査機構２２，２３がそれぞれ配設されている。検査胴２１の斜め下方に渡し胴２４を介して配設された紙取胴２５と同軸上には、左右一対のスプロケット２６が軸着されており、このスプロケット２６と、印刷装置１４の給紙胴２７と同軸上の一対のスプロケット２８との間には、図に矢印で示す方向に走行する搬送チェーン２９が架架されている。

印刷装置１４には、周面に番号器と印章用版とがそれぞれ装着された版胴３０，３１が上下に配設されており、中央部に設けられた圧胴３２には、これら両版胴３０，３１と前記給紙胴２７とが対接されている。符号３３，３４で示すものは、圧胴３２に順次対接された渡し胴であって、渡し胴３４に対接する排紙胴３５と同軸上の左右一対のスプロケット３６と、排紙装置１５のスプロケット３７との間には、図に矢印で示す方向に走行する排紙チェーン３８が架架されている。

排紙装置１５には、排紙チェーン３８から解放されて落下する紙１６を積載する紙積台３９，４０が前後に配設されており、また、スプロケット３７の下方には、検査機構２２，２３からの不正紙検出信号によって排紙方向を切替えられて排出される不正紙やその他の抜取り紙などを受ける排紙受け４１が設けられている。

尚、以上のように構成された検査輪転印刷機１１には、全体を符号４２で示す紙あばれ防止装置が、検査装置１３と印刷装置１４とにそれぞれ設けられており、以下、印刷装置１４に設けられたものについて説明する。前記圧胴３２は、左右のフレーム４３，４４に軸受４５を介して軸支されており、その一方の軸端部には、大径部４６ａと小径部４６ｂとを有するカム面を周面に備えたブラシ揺設用カム４６が、フレーム４３に固設して軸着されている。一方、図に矢印D，Eでそれぞれ示す方向に回転する印胴３２と版胴３０との回転当込み部近傍には、紙軸方向と平行するブラシ軸４７が、ブラシユ４８を介し左右のフレーム４３，４４に揺動自在に軸支されており、このブラシ軸４７上には、ブラシ４９が植設されている。

ブラシ４９は、圧胴３２とほぼ同長に形成されてブラシ軸４７に固定されたホルダ５０と、このホルダ５０に着脱自在に保持されたこれとほぼ同長のブラシ本体５１とで形成されており、ブラシ軸４７と一体となつて回動するように構成されている。また、ブラシ軸４７の一端には、直進部にころ５２が枢着されたカムレバー５３がフレーム４３に固定して固定されており、ころ５２は、カム４８のカム面に対接されている。カムレバー５３の中央部に一端を枢着さればね軸５４の他端は、フレーム４３に植設されたフランジ付スタッド５５の植孔に揺動自在に軸支されており、スタッド５５とばね軸５４の枢部との間には、ころ５２をカム４８のカム面へ圧接させる方向の回動力をカムレバー５３に付与する圧縮コイルばね５６が介装されている。そして、ころ５２がカム４８の小径部４８ｂに対接したときには、ブラシ本体５１の毛先が圧胴３２上の紙１６の面に接接し、また大径部４８ａに対接したときには紙１６の面から離間するように構成されている。さらに、操作側のフレーム４４には、カラー５７と軸止カム５８とで軸方向への移動を規制された操作軸５９が、ブラシ軸４７の上方に位置して回動自在に軸支されており、その外端部には、回動操作用の操作レバー６０が枢着されている。前記軸止カム５８は、操作軸５９の軸芯に対して偏心する円形のカム面を有しており、その最大半径部には、切欠６１が設けられている。６２は、ブラシ軸４７に軸着されて従動部のころ６３を着型カム５８のカム面に対接させたカムレバーであつて、前記圧縮コイルばね５６によりころ６３をカム面に圧接させる方向の回動力を付与されている。そして、操作レバー６０でカム５８を切欠６１がころ６２と係合するまで回動させることにより、前記カム４８の回動にかかわらず常時ブラシ４９の毛先が紙面から離間するように構成されている。

全体を符号６４で示すものは、圧胴３２の外周切欠き部６５内に設けられた咥え爪装置であつて、胴全長にわたる爪軸６６上に並設された複数個の爪６７を備えており、切欠き部６５の壁面には、爪６７との間で紙１６を咥える爪台６７が突着されている。また、爪６７は、爪ばね６８によつて爪先を爪台に圧接させる方向の回動力を付与されている。

なお、紙あばれ防止装置４２は、これと基本的構成のものが、検査胴２５，２１の上方にも設けられている。

以上のように構成された検査装置付印刷機の動作を説明する。給紙が印刷されて紙積台１７上に枚積された紙１６は、給紙装置１２によつて給板１３上へ１枚ずつ送り出され、スイング１９に咥えられてその揺動により搬送されたのち検査胴２６の爪に咥え替えられる。この紙１６は検査胴２０，２１、差し胴２４と振取胴２５とで搬送チェーン２９により印刷装置１４へ向つて搬送され、圧胴３２の咥え爪装置６４に咥え替えられて搬送される。そして、紙１６は、圧胴３２と版胴３０，３１との間を通過するときに表面へ番号と印刷の印刷が施され、差し胴３３，３４と排紙胴３５を経て排紙チェーン３８で排紙装置１５へ向つて搬送される。搬送された紙１６は、排紙チェーン３８から解放されて落下し、紙積台３９と４０とへ所定枚ごとに切替えられて交互に積載される。そして、紙１６の表面および裏面の不良箇所を検出機２２，２３が検出して信号を発すると、この信号によつて所定のタイミング後に版胴３０，３１が圧胴３２から離間し、不正紙には番号と印刷の印刷が行なわれない。また、この信号によりさらに遅れたタイミングで排紙チェーン３８の爪開放装置が切替えられ、不正紙は排紙受け４１上へ排紙される。

以上のようにして行なわれる印刷作業においては、前述したように、圧胴３２の咥え爪装置６４が紙１６を咥えて圧胴３２と版胴２８との接触点を通ぎると、紙１６の後半部が自保持状態であるから版胴２８，３２の印圧によつてしごかられるとともに、圧胴３２の回転慣性力で振り飛されてばたつこうとする。しかしながら、本装置では、ブラシ４９の毛先が紙１６の表面に接接されていてこれを圧胴３２の周面に圧接させているので、紙１６が浮き上つたりばたついたりすることがない。そして、ブラシ着脱用カム４８の小径部４８ｂに対向したときにのみブラシ４９の毛先が圧縮コイルばね５６の弾発力によつて後退に離接され、大径部４８ａに対向したときに接接面から離間するようになつているので、カム４８の位相設定により爪６７が版胴２８，３２の接触点を通過するわず

か前にころ５２が小径部４６ｂに対向し始めるようにしておけば、ブラシ４８は必要なときにのみ紙１０を圧接し、ブラシ４８と爪８８とが接触することがない。そして、ブラシ４８で紙１０を押圧する必要があるのは、紙厚が0.1mm程度以下の場合であって、これよりも厚紙の場合は紙がはたつく虞がなくブラシ４８の必要がない。そこで、この場合には操作レバー６９を操作して着脱カム５８を圧縮コイルばね５６の弾発力に抗して回動させ、切換８１をころ８３に対向させると、ブラシ４８の毛先が紙面から離間し、ブラシ着脱用カム４５はころ５２を離間させたまま実転する。この場合カムレバー８２は圧縮コイルばね５８で付勢されているので、ころ８３と切換６１との係合が保持されて外れることがなく、厚紙印刷時この状態を保持することができる。

なお、検出爪２０，２１に設けた紙あばれ防止装置４２も同様に動作し、紙１０の浮き上りを防止することができ、検出爪２２，２３が同動作することがない。

以上は、本考案を枚葉紙印刷機に実施した例を示したが、第７図に示すようなオフセットと凹版との複合印刷機にも実施することができ、この場合さらに効果的である。この印刷機の構成を説明すると、前記印刷機１１とほぼ同様成の給紙装置７１と排紙装置７２との間に設けられた印刷装置７３には、全体を符号７４で示すオフセット印刷装置と、符号７５で示す凹版印刷装置とが、渡し胴７６を介して前後に配設されており、オフセット印刷装置７４と給紙装置７１との間には搬板７７とスイング７８および渡し胴７９，８０が設けられている。オフセット印刷装置７４は、渡し胴８０に対接する圧胴８１とこれに対接する合径のゴム胴８２とを備えており、ゴム胴８２には、版を装着した４色の版胴８３，８４，８５，８６が対接されている。また、各版胴８３，８４，８５，８６には、インキ装置８７とローラ群とからなるインキ装置が移動自在なフレーム８８内に収納されてそれぞれ付設されている。一方、凹版印刷装置７５は、合径の圧胴８９とこれに対接する同じく合径の凹版胴９０とを備えており、凹版胴９０には、凹版が装着されているとともに、３色の着ローラ９１，９２，９３が対接されている。また、各着ローラ９１，９２，９３には、インキ装置９４とローラ群とからなるインキ装置が移動自在なフレーム９５内に収納されてそれぞれ付設されている。９６は、凹版面の余分なインキを拭きとるワイピングローラである。そして前記紙あばれ防止装置４２は、オフセット印刷装置７４の圧胴８１とゴム胴８２との回転咬込み部近傍に設けられている。

このような印刷機において、爪の咥え替えにより印刷装置７３へ供給された紙は、圧胴８１とゴム胴８２との間を通過するときに４色のオフセット印刷が施され、渡し胴７９を経て圧胴８９と凹版胴９０との間を通過するときにオフセット印刷面と同じ面に３色の凹版印刷が施されて排紙される。そして、この印刷機は、印圧調整がオフセット印刷装置７４と凹版印刷装置７５とでそれぞれ単独に行なわれるので他に影響することがなく、また、両印刷装置７４，７５間における咥え替えが２回で済み印刷位置精度の保持上有利である等の特長を有している。さらに、渡し胴７６，圧胴８９，凹版胴９０のなす角度が鋭角であるから、凹版印刷時の印圧が渡し胴７６と圧胴８９との芯間距離を変動させることがなく咥え替えが安定しているという長所を有している。

そして、紙あばれ装置４２は、前記実施例と同じ動作をするが、ゴム胴８２が圧胴８１よりも下方に設けられたこの印刷機においては、渡し胴８０と圧胴８１との咬持から開放された紙尻部が垂れ下がろうとするので、ブラシ４８の毛先でこれを押えることができ、紙あばれ装置４２がさらに有効に作用する。

なお、本考案は、前記各実施例のほかに、各種のオフセット印刷機や凹版印刷機などの枚葉輪転印刷機にも同様に実施できることは言うまでもない。

以上の説明により明らかなように、本考案によれば、枚葉輪転印刷機の圧胴部における紙あばれ防止装置において、胴胴部の搬送紙面に毛先を接触させて胴軸方向に延びるブラシを回動自在なブラシ軸で支持させるとともに、このブラシ軸に固定したカムレバーの揺動端のころを胴軸上のカムのカム面にばね部材で圧接させ、胴の回転にしたがってブラシを紙面に接離させるように構成することにより、紙咬持状態の搬送紙後半部が胴面から浮き上るのを押えることができ、紙のばたつきに

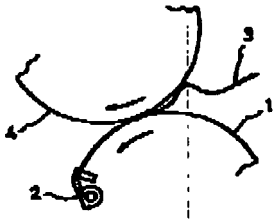
よる汚れや画像の転写を防止することができるので、印刷物の品質が著しく向上し損紙の発生量が減少するとともに、ブラシを所定のタイミングで胴周面から離間させることができるので、ブラシが爪などと干渉する虞がなくブラシの耐久性が著しく向上する。

図面の簡単な説明

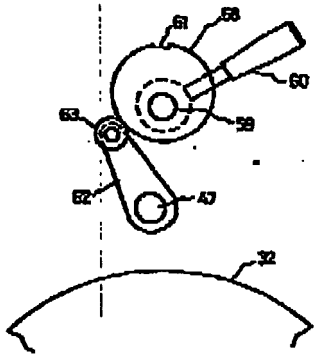
第１図は従来の枚葉軸転印刷機の咥え替え時における紙の挙動の説明図、第２図ないし第７図は本考案に係る枚葉軸転印刷機における胴周部の紙あばれ防止装置の実施例を示し、第２図はこれを実施した枚葉軸転印刷機の概要側面図、第３図は紙あばれ防止装置の展開断面図、第４図は第３図のAA断面図、第５図は第３図のBB断面図、第６図は第３図のC視拡大正面図、第７図は本考案を実施したオフセット・凹版複合印刷機の概要側面図である。

１６――版、３２――圧胴、４２――紙あばれ防止装置、４６――ブラシ着脱用カム、４８ａ――大径部、４８ｂ――小径部、４７――ブラシ軸、４９――ブラシ、５１――ブラシ本体、５２――ころ、５３――カムレバー、５６――圧胴コイルばね。

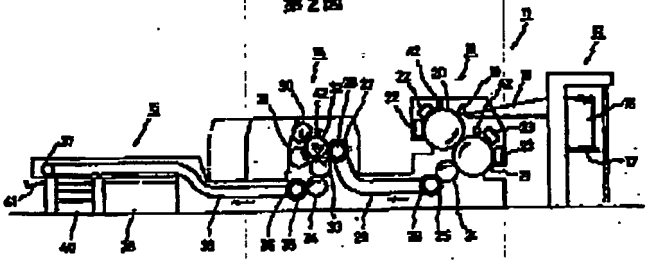
第１図



第６図

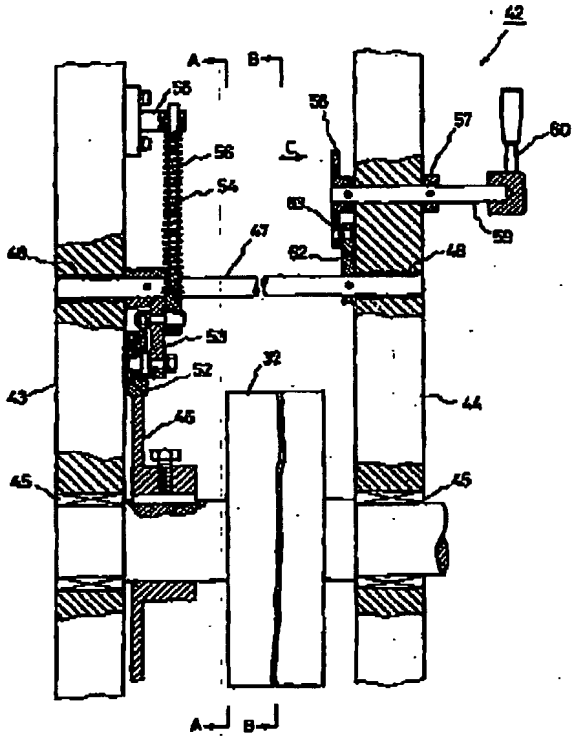


第２図



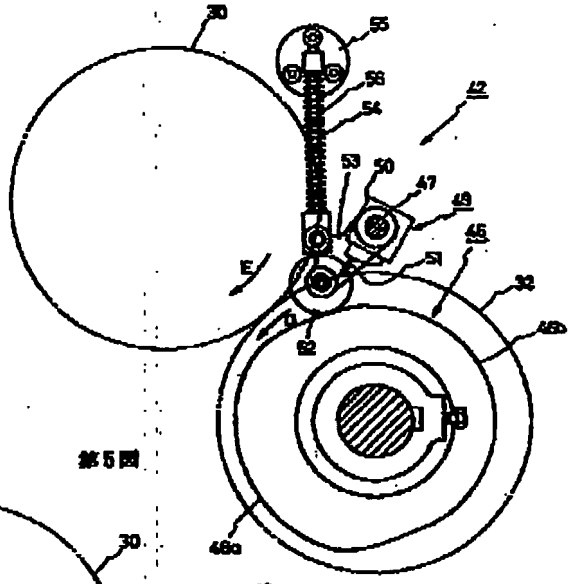
(8) 実公 平3-12510

第3図

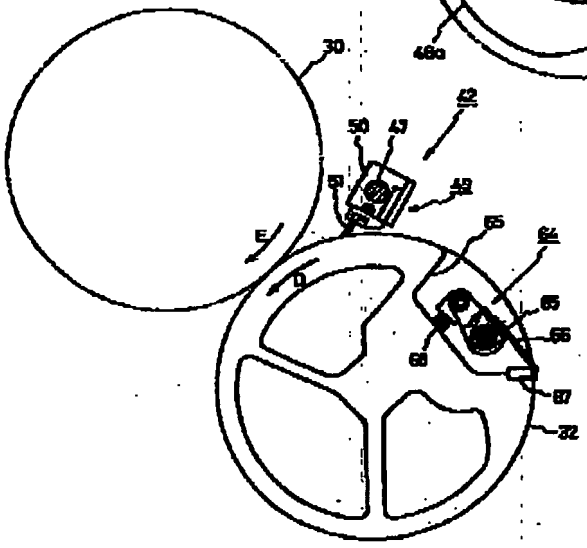


(7) 実公 平3-12510

第4図

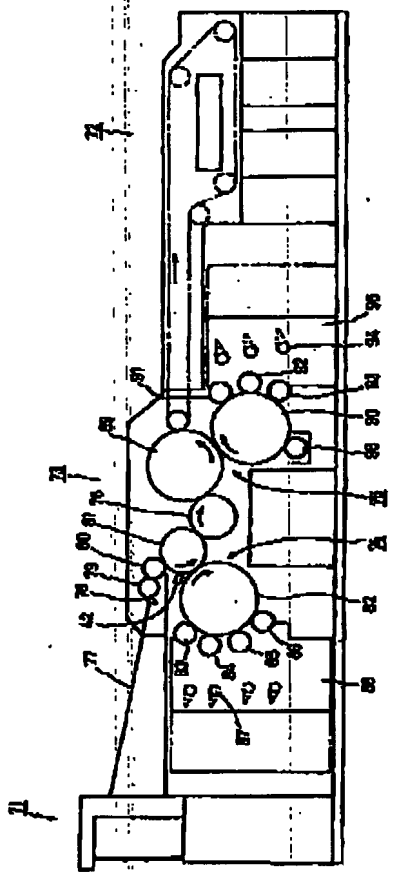


第5図



(a)

実公 平 3-12510



第7図

TRANSLATION of Japanese Utility Model Publication No. 03-012510

Title of the Invention: Device for Preventing a Sheet of Paper from Falling into Disorder in a Sheet-fed Rotary Printing Press

Publication Date: March 25, 1991
Utility Model Application: No. 57-42239
Filing Date: March 24, 1982

Applicant: Komori Co., Ltd.

SCOPE OF CLAIM OF THE UTILITY MODEL

A device for preventing a sheet of paper from falling into disorder in a sheet-fed rotary printing press comprising: a brush shaft pivotally arranged in parallel with a direction of a drum shaft being close to a circumferential face of the drum; a brush fixed to the brush shaft and extended in the direction of the drum shaft while tips of hair are being contacted with a surface of the sheet of paper conveyed on the circumferential face of the drum; a cam lever fixed to an end portion of the brush shaft, a roller being attached to an idle end portion of the shaft; a brush attaching and detaching cam having a cam face formed out of a large diameter portion and a small diameter portion to be contacted with the roller, being fixed to an end portion of the drum shaft; and a spring means for giving torque in a direction, in which the roller is made come into pressure contact with the cam face, to the cam lever.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a device for preventing a trailing end portion, which is not held, of a

sheet of paper seized by a pawl from falling into disorder in a sheet-fed rotary printing press.

There are many types of sheet-fed rotary printing presses such as an offset printing press, intaglio printing press, a dry offset intaglio printing press, an inspection printing press and so forth. Any of these printing presses includes: a printing device having a group of printing drums and an ink feeding device; a sheet supply device arranged before the printing device; and a sheet discharge device arranged after the printing device. The inspection printing device further includes: an inspection drum; and an inspection mechanism. While a leading end portion of a sheet of paper, which has been sent out by the sheet supply device one by one, is being seized by pawls of the printing drum, the inspection drum and the conveyance chain, the sheet of paper is conveyed.

However, in this sheet-fed rotary printing press, the behavior of a sheet of paper, which is wound round a circumference of the drum after the leading end portion has been seized by the pawl, causes some problems. Fig. 1 is a schematic illustration showing an offset printing press which is taken up as an example. The sheet of paper 3, which has been shifted from the seizure by a pawl of the swing device in the front stage portion or from the seizure by a pawl of the delivery drum to the seizure by the pawl 2 of the pressure drum 1, passes between the pressure drum 1 rotating in the arrow direction and the rubber drum 4 and is wound round a circumferential face of the pressure drum 1. Therefore, an image is transferred from the rubber drum 4 onto a surface of the sheet of paper 3 on the rubber drum 4 side. In this way, printing is executed. However, as

shown in the drawing, under the condition that a leading end of the sheet of paper 3, which is seized by the pawl 2, has passed through a contact point between both drums 1, 4, since a second half portion of the sheet of paper 3 is not held by anything, when both drums 1, 4 are rotated at high speed while the sheet of paper 3 is being given a printing pressure by both drums 1, 4 so that printing can be executed, the sheet of paper 3 is ironed in a direction of the trailing end of the sheet of paper by both drums 1, 3. At the same time, the sheet of paper 3 is waved by a centrifugal force and flapped. Therefore, the sheet of paper passes while it is flapping at a position 30 to 50 mm higher than the circumferential face. Accordingly, a portion of the sheet of paper 3 comes into contact with a circumferential face of the rubber drum 4 and ink adheres onto the sheet of paper 3. Therefore, the sheet of paper 3 is stained with ink and further a portion of the image is transferred. When the adhesion of ink is made onto the sheet of paper 3 as described above under the condition that the sheet of paper 3 is closely contacted with the circumferential face of the rubber drum 4, no problems are caused. However, when the adhesion of ink is made onto the sheet of paper 3 while the sheet of paper 3 is flapping as shown in the drawing, a picture formed by the adhesion ink deviates a little from a picture which will be normally formed being transferred later. Therefore, double printing is made. The above explanations are made in the case of the printing drum. In the case of the inspection drum, a sheet of paper wound round a circumferential face of the drum is inspected by the inspection mechanism. Therefore, when this sheet of paper is flapped as shown in Fig. 1, the

inspection accuracy is remarkably deteriorated, which will become a cause of malfunction.

Since various problems are caused as described above, it is conventional that a brush is provided before the contact portion of both drums and contacted with a sheet of paper which is going to flap, so that the flapping sheet of paper can be suppressed. However, as shown in Fig. 1, a tip portion of the pawl 2 is higher than a surface of the sheet of paper 3. Therefore, the brush is periodically snapped by the pawl 2. Accordingly, the durability of the brush is very low and it is necessary to replace the brush very frequently.

The present invention has been accomplished in view of the above points. A brush extending in an axial direction of a drum, the tips of hair of which are contacted with a surface of a sheet of paper conveyed in a circumferential portion of a drum, is supported by a brush shaft capable of freely rotating. A roller attached to an idle end portion of a cam lever fixed to this brush shaft is made to come into pressure contact with a cam face of a cam provided on a drum axis by a spring member. According to the rotation of the drum, the brush is attached to and detached from a surface of the sheet of paper. Due to the foregoing, only when necessary, the brush is contacted with the surface of the sheet of paper so that the sheet of paper can be prevented from falling into disorder. When unnecessary, the brush is separated from the surface of the sheet of paper so that the brush can not be abraded by the contact with the pawl. The present invention provides a device for preventing a sheet of paper from falling into disorder in a circumferential portion of a drum in a sheet-fed rotary

printing press. Referring to drawings, an embodiment of the present invention will be explained in detail below.

In the present embodiment, the present invention is applied to an inspection rotary printing press. Fig. 2 is a side view showing an outline of a printing press to which the present invention is applied. Fig. 3 is a developed sectional side view of a device for preventing a sheet of paper from falling into disorder. Fig. 4 is a sectional view taken on line A - A in Fig. 3. Fig. 5 is a sectional view taken on line B - B in Fig. 3. Fig. 6 is an enlarged front view taken in a direction of C in Fig. 3. In the drawing, the inspection rotary printing press 11 includes: a sheet supply device 12; an inspection device 13; a printing device 14; and a sheet discharge device 15. The sheet supply device 12 has a sheet loading table 17, on which sheets of paper 16 such as bank notes having a picture printed in the pre-step are loaded, and when a weight of the loaded sheets of paper is reduced, the sheet loading table 17 is automatically raised. In an upper end portion of the inspection device 13, the swing device 19 is arranged which seizes and swings a sheet of paper 16 which has been sent out onto the delivery plate 18 by the sheet supply device 12 one by one. In a lower portion of the inspection device 13, a pair of inspection drums 20, 21 are pivotally arranged in such a manner that the circumferential faces of the inspection drums 20, 21 are opposed to each other. In outer circumferential cutout portions of these inspection drums 20, 21, a plurality of pawls, which are opened and closed by a cam mechanism, are arranged in the axial direction in parallel with each other. After the pawls have seized the sheet of paper 16

conveyed by the swing 19, when the inspection drums 20, 21 are rotated in the arrow direction shown in Fig. 1, while the sheet of paper 16 is being wound round the circumferential faces of the drums 20, 21, the sheet of paper 16 is conveyed. In the neighborhoods of the circumferential faces of the inspection drums 20, 21, the inspection mechanisms 22, 23 are respectively arranged which inspect pictures on both sides of the conveyed sheet of paper 16 and detect a defective sheet of paper and emit a signal of detection. On the same axis as that of the sheet taking drum 25 arranged in an oblique lower portion of the inspection drum 21 through the delivery drum 24, a pair of sprockets 26 are attached. Between these sprockets 26 and a pair of sprockets 28 on the same axis as that of the sheet supply drum 27 of the printing device 14, the conveyance chain 29 traveling in the arrow direction shown in the drawing is provided.

In the printing device 14, the print drums 30, 31, on the circumferential faces of which the numbering machine and the seal print are respectively attached, are provided in the vertical direction. The pressure drum 32 arranged in the central portion is opposed to and contacted with both the print drums 30, 31 and the sheet supply drum 27. Reference marks 33, 34 are delivery drums opposed to and contacted with the pressure drum 32 in order. Between a pair of sprockets 36, which are arranged on the same axis as that of the sheet discharge drum 35 opposed to and contacted with the delivery drum 34, and the sprockets 37 of the sheet discharge device 15, the sheet discharge chain 38 traveling in the arrow direction shown in the drawing is provided.

In the sheet discharge device 15, the sheet loading tables 39, 40, on which the sheets of paper 16 released and dropped from the sheet discharge chain 38 are loaded, are arranged in the longitudinal direction. In a lower portion of the sprocket 37, the discharged sheet reception 41 is provided which receives defective sheet of paper discharged when a discharging direction is changed over by a defective sheet detection signal sent from the inspection mechanisms 22, 23 and also receives other sheets of paper to be drawn out.

In the inspection rotary printing press 11 composed as briefly described above, the devices for preventing a sheet of paper from falling into disorder, the entire devices of which are represented by reference mark 42, are respectively arranged in the inspection device 13 and the printing device 14. The device for preventing a sheet of paper from falling into disorder arranged in the printing device 14 will be explained below. The pressure drum 32 is supported by the right and left frames 43, 44 through the bearings 45. To one shaft end portion, the brush attaching and detaching cam 46, on the circumferential face of which a cam face having the large diameter portion 46a and the small diameter portion 46b is provided, is attached being adjacent to the frame 43. On the other hand, in the neighborhood of a rotation biting portion of the pressure drum 32 and the print drum 30 rotating in the directions of the arrows D and E shown in the drawing, the brush shaft 47 extending in parallel with the drum axis direction is pivotally supported by the right and left frames 43, 44 through the brush 48. On this brush shaft 47, the brush 49 is provided. The brush 49 includes: a holder 50, the

length of which is substantially the same as that of the pressure drum 32, fixed to the brush shaft 47; and a brush body 51 the length of which is substantially the same as that of the holder 50, detachably held by the holder 50. The brush 49 is rotated integrally with the brush shaft 47. To one end of the brush shaft 47, the cam lever 53, to the idle end portion of which the roller 52 is attached, is fixed being adjacent to the frame 43. The roller 52 is opposed to and contacted with a cam face of the cam 46. The other end portion of the spring shaft 54, one end of which is attached to the central portion of the cam lever 53, is slidably supported by a shaft hole of the stud 55 having a flange provided in the frame 43. Between the stud 55 and the step portion of the spring shaft 54, the compression coil spring 56 is provided which gives torque for making the roller 52 come into pressure contact with the cam face of the cam 46 to the cam lever 53. When the roller 52 is opposed to and contacted with the small diameter portion 46b of the cam 46, the tips of hair of the brush body 51 are contacted with a surface of the sheet 16 of paper on the pressure drum 32. When the roller 52 is opposed to and contacted with the large diameter portion 46a of the cam 46, the tips of hair of the brush body 51 are separated from a surface of the sheet 16 of paper on the pressure drum 32. Further, in the frame 44 on the operation side, the operation shaft 59, the movement in the axial direction of which is regulated by the collar 57 and the attaching and detaching cam 58, is pivotally supported being positioned at an upper position of the brush shaft 47. In the outer end portion, the operation lever 60 for operating the rotation is attached. The attaching and

detaching cam 58 has a circular cam face which is eccentric with respect to the axial center of the operation shaft 59. In the maximum radius portion of the attaching and detaching cam 58, the cut groove 61 is provided. Reference numeral 62 is a cam lever attached to the brush shaft 47 and having the roller 63 at an idle end portion in such a manner that the roller 63 can be opposed to a cam face of the attaching and detaching cam 58. The cam lever 62 is given torque in a direction by the compression coil spring 56 so that the roller 63 can be contacted to the cam face with pressure. When the cam 58 is rotated by the operation lever 60 until the cut groove 61 is engaged with the roller 63, the tips of hair of the brush 49 are always separated from the surface of the sheet of paper irrespective of the rotation of the cam 46.

Reference numeral 64 represents a seizing pawl device provided in the cutout portion 65 on the outer circumference of the pressure drum 32. The seizing pawl device 64 has a plurality of pawls 66 arranged in parallel with each other on the pawl shaft 65 extending all over the drum length. On a wall face of the cutout portion 65, the pawl table 67 for seizing the sheet 16 of paper between the pawls 66 is attached. The pawls 66 are given torque by the pawl spring 68 in a direction so that the forward end portions of the pawls can be contacted to the pawl table with pressure.

In this connection, the substantially same devices for preventing a sheet of paper from falling in disorder as the device 42 described above are also provided in upper portions of the inspection drums 20, 21.

Operation of the inspection rotary printing press

composed as described above will be explained below. The sheets of paper 16, on which pictures have been printed, loaded on the sheet loading table 17 are sent out one by one onto the delivery plate 18 by the sheet supply device 12 and seized by the swing 19 and conveyed by a swinging motion of the swing 19. After that, the sheet of paper is seized by a pawl of the inspection drum 20. This sheet 16 of paper passes through the inspection drums 20, 21, the delivery drum 24 and the sheet taking drum 25 and is conveyed toward the printing device 14 by the conveyance chain 29. Then, the sheet of paper is seized by the seizing pawl device 64 of the pressure drum 32 and conveyed. When the sheet 16 of paper passes between the pressure drum 32 and the print drums 30, 31, the number and the seal are printed on a surface of the sheet 16 of paper. Then, the sheet 16 of paper is conveyed toward the sheet discharge device 15 by the sheet discharge chain 38 through the delivery drums 33, 34 and the sheet discharge drum 35. The conveyed sheet 16 of paper is released and dropped from the sheet discharge chain 38 and alternately loaded onto the sheet loading tables 39, 40 being changed over for a predetermined quantity of sheets of paper. When a defective portion on the surface side and a reverse side of the sheet 16 of paper is detected by the detection mechanisms 22, 23 and a detection signal is emitted, the print drums 30, 31 are separated from the pressure drum 32 being based on the signal after a predetermined timing has passed. Therefore, no number and seal are printed on the defective sheet of paper. At the more delayed timing, a pawl release position of the sheet discharge chain 38 is changed over and the defective sheet of paper is discharged

onto the discharge sheet reception 41.

In the printing work executed in this way, as described above, when the seizing pawl device 64 of the pressure drum 32 seizes the sheet 16 of paper and passes through a contact point of the pressure drum 32 and the print drum 30, since the second half portion of the sheet 16 of paper is not held, the sheet 16 of paper is ironed by the printing pressure given by both the drums 30, 32 and further waved and flapped by a rotary centrifugal force given by the pressure drum 32. However, according to the present device, since the tips of hair of the brush 49 come into contact with a surface of the sheet 16 of paper so that the sheet 16 of paper is made to come into pressure contact with a circumferential face of the pressure drum 32. Accordingly, there is no possibility that the sheet 16 of paper is waving and flapping. Since the brush attaching and detaching cam 46 is provided, only when the roller 52 is opposed to the small diameter portion 46b of the cam 46, the tips of hair of the brush 49 are contacted with a surface of the sheet of paper by an elastic force of the compression coil spring 56. When the roller 52 is opposed to the large diameter portion 46a of the cam 46, the tips of hair of the brush 49 are separated from the surface of the sheet of paper. Therefore, when it is set by the phase setting of the cam 46 that the roller 52 starts opposing to the small diameter portion 46b right before the pawl 66 passes through a contact point of both the drums 30, 32, the brush 49 comes into contact with the sheet 16 of paper only when necessary and there is no possibility that the brush 49 and the pawl 49 are contacted with each other. Only when the thickness of a sheet of paper is not more

than 0.1 mm, it is necessary for the brush 49 to push the sheet 49 of paper. When the thickness of a sheet of paper is larger than that, there is no possibility that the sheet of paper is waving and flapping. Accordingly, it is unnecessary to use the brush 49. Therefore, in this case, the operation lever 60 is operated and the attaching and detaching cam 58 is rotated resisting an elastic force of the compression coil spring 56 and the cut groove 61 is opposed to the roller 63. Then, the tips of hair of the brush 49 are separated from a surface of the sheet of paper. Accordingly, the brush attaching and detaching cam 46 is idly rotated while the roller 52 is being separated from it. In this case, since the cam lever 62 is pushed by a pushing force of the compression coil spring 56, an engagement of the roller 63 with the cut groove 61 is maintained, that is, the roller 63 and the cut groove 61 are not disengaged from each other. While printing is being conducted on thick sheets of paper, this state can be maintained.

In this connection, the devices 42 for preventing a sheet of paper from falling into disorder provided in the inspection drums 20, 21 are operated in the same manner and it is possible to prevent the sheet 16 of paper from waving. Accordingly, there is no possibility that the inspection mechanisms 22, 23 are erroneously operated.

An example in which the present invention is applied to an inspection rotary printing press is shown above. However, it is possible to apply the present invention to a compound printing press in which offset printing and intaglio printing are combined with each other as shown in Fig. 7. The present invention can be more effectively

applied to this case. The constitution of this printing press will be explained below. In the printing device 73, which is composed in the substantially same manner as that of the printing press 11 described before and which is provided between the sheet supply device 71 and the sheet discharge device 71, the offset printing press represented by reference mark 74 and the intaglio printing press represented by reference mark 75 are longitudinally arranged through the delivery drum 76. Between the offset printing press 74 and the sheet supply device 71, the delivery plate 77, the swing 78 and the delivery drums 79, 80 are provided. The offset printing press 74 includes: a pressure drum 81 opposed to the delivery drum 80; and a rubber drum 82, the diameter of which is twice as large as that of the pressure drum 81, opposed to the pressure drum 81. The printing drums 83, 84, 85, 86 of four colors attached with the print are opposed to the rubber drum 82. Each printing drum 83, 84, 85, 86 is attached with an ink device having an ink pot 87 and a group of rollers. Each ink device is accommodated in the movable frame 88. On the other hand, the intaglio printing press 75 includes: a pressure drum 89, the diameter of which is twice as large; and an intaglio printing drum 90, the diameter of which is twice as large, opposed to the pressure drum 89. The intaglio printing drum 90 is attached with an intaglio print and opposed to the rollers 91, 92, 93 of three colors. Each roller 91, 92, 93 is attached with an ink device having an ink pot 94 and a group of rollers. Each ink device is accommodated in the movable frame 95. Reference numeral 96 is a wiping roller for wiping out redundant ink. The device 42 for preventing a sheet of

paper from falling into disorder described before is arranged in the neighborhood of the rotary biting portion between the pressure drum 81 and the rubber drum 82 of the offset printing press 74.

In this printing press described above, when a sheet of paper, which is supplied to the printing device 73 being seized by the pawl, passes between the pressure drum 81 and the rubber drum 82, offset printing of four colors is executed. When the sheet of paper passes between the pressure drum 89 and the intaglio printing drum 90 through the delivery drum 76, intaglio printing of three colors is executed on the same face as that of offset printing. Then, the sheet of paper is discharged. This printing press is advantageous as follows. In this printing press, a printing pressure adjustment is respectively singly executed in the offset printing device 74 and the intaglio printing device 75. Therefore, the printing pressure adjustment does not affect others. Further, the number of times of changing the seizure of the sheet of paper can be only two, which is advantageous for maintaining the accuracy of printing estimation. In this printing press, an angle formed by the delivery drum 76, the pressure drum 89 and the intaglio printing drum 90 is substantially 90°. Therefore, a printing pressure given at the time of intaglio printing does not change a distance between the centers of the delivery drum 76 and the pressure drum 89. Accordingly, the seizure of a sheet of paper can be stably changed.

The device 42 for preventing a sheet of paper from falling into disorder is operated in the same manner as that of the embodiment described before. However, in this

printing press in which the rubber drum 82 is arranged at a lower position of the pressure drum 81, since a trailing end of the sheet of paper, which has been released from the hold made by the delivery drum 80 and the pressure drum 81, is going to hang down, it is possible for the tips of hair to suppress the trailing end of the sheet of paper. Therefore the device 42 or preventing a sheet of paper from falling into disorder can be more effectively operated.

In this connection, of course, it is possible to apply the present invention in the same manner not only to the embodiments described above but also to sheet-fed rotary printing presses such as various offset printing presses and intaglio printing press.

As can be clearly seen in the above explanations, according to the present invention, in a device of preventing a sheet of paper from falling into disorder in a circumferential portion of a drum of a sheet-fed rotary printing press of the present invention, a brush extending in an axial direction of a drum, the tips of hair of which are contacted with a surface of a sheet of paper conveyed in a circumferential portion of a drum, is supported by a brush shaft capable of freely rotating. A roller attached to an idle end portion of a cam lever fixed to this brush shaft is made to come into pressure contact with a cam face of a cam on a drum axis by a spring member. According to the rotation of the drum, the brush is attached to and detached from a surface of the sheet of paper. According to the above constitution, it is possible to prevent a second half portion, which is not held while a sheet of paper is being conveyed, of the sheet of paper from waving on a drum surface. Therefore, it is possible to prevent

the stain of an image caused by flapping of the sheet of paper. Further it is possible to prevent the transfer of an image caused by flapping of the sheet of paper. Accordingly, the quality of prints can be remarkably enhanced and a quantity of defective sheets of paper can be reduced. Further, since the brush can be separated from the circumferential surface of the drum at a predetermined timing, there is no possibility that the brush and pawls interfere with each other. Accordingly, the durability of the brush can be remarkably enhanced.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic illustration for explaining the behavior of a sheet of paper at the time of changing the seizure of the sheet of paper in a conventional sheet-fed rotary printing press. Figs. 2 to 7 are views showing an embodiment of the device for preventing a sheet of paper from falling into disorder in the circumferential portion of the drum of the sheet-fed rotary printing press of the present invention, wherein Fig. 2 is a side view briefly showing an inspection rotary printing press in which the embodiment is executed, Fig. 3 is a developed sectional side view of the device for preventing a sheet of paper from falling into disorder, Fig 4 is a sectional view taken on line A - A in Fig. 3, Fig. 5 is a sectional view taken on line B - B in Fig. 3, Fig. 6 is an enlarged front view taken in the direction of C in Fig. 3, and Fig. 7 is a side view briefly showing an offset · intaglio compound printing press in which the present invention is executed.

16 · · · Sheet of paper

32 · · · Pressure drum

42 · · · Device for preventing a sheet of paper from

falling into disorder

46 · · · Cam for attaching and detaching a brush

46a · · · Large diameter portion

46b · · · Small diameter portion

47 · · · Brush shaft

49 · · · Brush

51 · · · Brush body

52 · · · Roller

53 · · · Cam lever

56 · · · Compression coil spring